STRATEGY RESEARCH PROJECT

TRAINED AND READY COMBAT FORCES: THE ROLE OF TRAINING DEVICES IN SUSTAINING COMBAT FORCE PROFICIENCY DURING DEPLOYMENTS

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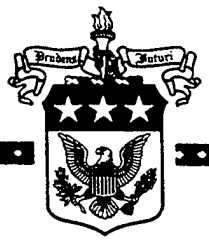

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ABSTRACT

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In the Post Cold War period (near/early 21st century), training devices are becoming even more critical to the sustainment training of deployed U.S. combat forces. To meet the objectives of the National Security Strategy of Engagement and Enlargement, the U.S. Army is deploying combat forces to engage in peacetime activities, such as Military Operations Other Than War (MOOTW). The Army's ground combat forces, even while engaged in MOOTW activities, must maintain proficiency to wage war in the event that peacetime engagement, deterrence and conflict prevention fail. While the Cold War focus was upon one enemy, our combat forces must now be trained for a variety of contingencies. Complicating training readiness is a shrinking defense budget and a "downsized" combat force that is being deployed with increasing frequency. This study addresses the efficiency and effectiveness of training devices for the sustainment training of critical combat skills of deployed combat forces. Data from the Army's recent experience in Bosnia, Operation Joint Endeavor, are highlighted. Recommendations concerning future acquisition of training devices for deployed forces are also presented.

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Introduction

During the Post Cold War period (near/early 21st century), training devices are becoming even more critical for the sustainment training of deployed U.S. combat forces. Today's soldiers are now away from home stations an average of about 138 days per year. In 1996 alone, an average of 36,000 soldiers were deployed in over 70 countries. Another 100,000 soldiers were forward deployed.[1] The complexity and increasing frequency of the deployment of U.S. forces requires a firm commitment to maintain combat force proficiency. Training devices that can be deployed with combat forces can maximize training opportunities and sustain requisite levels of combat readiness. Training devices are affordable, deployable and adequately train soldiers for a lower cost than using the actual combat systems. This paper will discuss the efficiency and effectiveness of training devices for sustainment training of deployed combat forces.

National Security and Military Strategies

A National Security Strategy of Engagement and Enlargement reflects America's foreign and domestic interests. The first of the strategy's three central goals is " . . . to enhance our security with military forces that are ready to fight and with effective representation abroad."[2] This goal clearly recognizes that " . . . to protect and advance

U.S. interests . . . the United States must deploy robust and flexible military forces that can accomplish a variety of tasks."[3] These tasks include: regional conflicts to deter and defeat aggression, a credible overseas presence, multilateral peace operations and humanitarian and disaster relief operations. The U.S. *National Military Strategy*, which is derived from the national security strategy, describes the critical national military objectives for our Armed Services to achieve in order to support the national objectives. Our national military objectives are twofold: promoting stability and thwarting aggression. A primary thrust of our strategy to thwart aggression can be achieved through maintaining robust warfighting capabilities.[4] In this manner, our forces must maintain combat training proficiency even when deployed for purposes other than warfighting.

To meet the national military objectives, the U.S. is deploying combat forces to engage in peacetime activities, many of which are referred to as Military Operations Other Than War (MOOTW). "The operations range from peacetime operations such as providing assistance to civil authorities, to contingencies such as a show of force, to combat operations associated with short duration interventions. Military operations other than war involve the use of the military instrument of national power."[5] The Army's ground combat forces, even while engaged in MOOTW activities, must maintain proficiency to wage war in the event that peacetime engagement, deterrence and conflict prevention fail.

This Strategy Research Project (SRP) paper will NOT discuss U.S. policy nor whether the current U.S. policy is correct. This paper will focus only on training implications of U.S. combat forces deployed on Military Operations Other Than War (MOOTW).

Today's Need for Training Devices and Simulators

During the Cold War, the focus (threat) of the U.S. military was upon one enemy. U.S. combat forces today, however, must be trained and ready for a variety of contingencies. With no identifiable single threat or peer competitor today, the U.S. " . . . post-Cold War military is to be based on capabilities rather than threats."[6] For this reason, it is imperative that our combat forces maintain a high level of training readiness even while deployed on MOOTW missions. These combat forces must maintain combat skills proficiency even when deployed in order to be prepared for two nearly simultaneous Major Regional Contingencies (MRCs) plus any number of smaller threats or Lesser Regional Contingencies (LRCs).

Further complicating training readiness is a shrinking U.S. defense budget (down 38% since 1989) and a "downsized" (reduced by 463,000 soldiers) combat force that is being deployed with increasing frequency (26 operational events since 1991).[7] The operational tempo (OPTEMPO), the rate at which units conduct deployments and training exercises, is up 300 percent.[8] This is giving Army leaders and even lawmakers cause for concern about the readiness of the U.S. military.[9] House National Security Committee member Representative Ike Skelton recently put this in perspective by stating that "Peacekeeping commitments may so degrade the armed forces' warfighting capability that it will be impossible to carry out the national military strategy."[10] A recent General Accounting Office (GAO) report concludes that one-fourth of frequently deployed U.S. combat units are unable to maintain combat readiness.[11] The GAO has also found that up to six months may be required " . . . for a ground combat unit to recover from a peace

operation and become combat ready."[12] While engaged in these peacetime deployment activities, units are receiving little or no combat proficiency training.

Sustainment training of critical combat skills for deployed combat maneuver forces can be difficult. Armor and mechanized infantry units are often unable to maneuver or live-fire when deployed overseas. Artillery units often cannot practice live indirect fire. However, training for combat support and combat service support forces is often not as significant a problem. Most combat support and combat service support units train or maintain their proficiency by performing "real" missions. Engineers build bridges, construct and maintain roads, and remove minefields. Military police are routinely used to help keep the peace and perform traffic control. The most recent examples of this are the combat engineers and military police engaged in a peacekeeping role in Bosnia. Other support units, such as supply and transportation, regularly engage in activities to sustain the force.

Combat units must train/sustain combat skills even while deployed to perform contingency missions to maintain the capability to fight and win if called upon. As the U.S. military forces continue to shrink, it is not inconceivable that a combat force performing a MOOTW mission could be called upon to deploy directly to another area of the world to fight and win a major (or lessor) regional contingency operation. However, some defense analysts now argue that combat units performing peacetime contingency operations lose their combat proficiency and should be considered as "not available" for combat mission deployment.[13] Although this allegation may not be publicly announced or perhaps even defensible, many Army commanders are still concerned about the combat readiness of deployed soldiers.[14]

Combat units, specifically soldiers with combat arms Military Occupational Specialties (MOSs), must retain volatile skills that deteriorate during long deployments. Most of the newer combat systems, such as the M1A2 Abrams tank and the M1A2/3 Bradley Fighting Vehicle System (BFVS), have sophisticated fire control systems of increasing complexity. Frequent sustainment training of these critical skills is necessary to retain proficiency at the individual, crew and platoon levels. Sustaining combat skill proficiency is also important to maintaining both personal and unit confidence, cohesion and morale.

Additionally, 55% of the Army is comprised of Reserve Components (RC). Therefore, the Army must rely heavily upon the Reserve Components to perform combat missions.[15] Of the Army's combat units, 56% are from the Reserve Components.[16] Many of the forces apportioned to the second MRC are comprised of as many as 80% RC assets.[17] However, Reserve Component combat units (primarily made up of National Guard units) traditionally lack preparation and training skills. This even further complicates the sustainment training of combat forces when RC units are deployed without warning to perform a MOOTW or a state's mission (such as disaster relief). While involved in any of these missions (MOOTW or domestic crises), RC/NG units must also retain the capability to fight in either a MRC or LRC.

There are many impediments to the sustainment training of deployed combat forces. Performing missions such as peacekeeping/peacemaking make training for combat units very difficult. Aside from having little opportunity to train while conducting day-to-day operations, U.S. forces must be concerned about the sensitivity of conducting combat proficiency training in the midst of peacekeeping activities. Conducting combat training

could cause tension and anxiety among the local citizens which could jeopardize the peacekeeping process.

Another training impediment is that most areas where the U.S. has deployed forces lack training (live-fire and maneuver) areas or the expanse of land that could be used for training areas. In some instances, there is a reluctance by the host nation to permit live-fire training. Such was the case in Saudi Arabia during Operation Desert Shield. During the massive buildup of coalition troops caused by Iraq's invasion of Kuwait, the Saudis were particularly careful to avoid sending a wrong signal by allowing coalition forces to conduct live-firing. The Saudis believed that this could have triggered an Iraqi preemptive attack upon Saudi Arabia before coalition forces were fully prepared to drive Iraqi forces from Kuwait.

Modern Training Technology

In spite of the many impediments to training, technology now exists to sustain combat proficiency of deployed soldiers. Recent advances in technology (i.e., computing power) have made simulators, or virtual trainers, available for realistic training of today's combat vehicle crews. Through simulations, training devices can approximate reality to produce an endless variety of tactical situations that confront the operator. According to the Center for Strategic and International Studies, "High technology simulations are producing a revolution in training."[18] By means of computer graphics imagery, for example, individual crew members can view a virtual battlefield through realistic weapon sights to detect, acquire and engage simulated enemy combat vehicles. Electronically

linking crew stations together permits armor or mechanized infantry crews to "fight" as platoons. Current technology also permits automatic scoring of engagements for immediate feedback and critique. While this may appear to be "star wars" technology for some, it is very real for most young soldiers who have grown up as part of the Nintendo^{R} generation. It is also possible that the full potential of these devices has yet to be realized.

Advancements in technology are continually making training devices more effective trainers for sustainment training of deployed combat forces. Training devices are affordable, deployable and effective trainers for a lower cost than using the actual combat systems. Many training devices are self-supporting and can be deployed with combat units to virtually anywhere in the world. They can be kept available for use by individuals/units when not involved in MOOTW duties. Training devices can also be used in the post-deployment/operations phase to facilitate a more rapid return of a unit's combat proficiency.

A variety of training devices, or simulators (described in succeeding paragraphs), are available to the armor, infantry and artillery communities today.[19] Rapid technological advances have made training devices much more affordable, higher in fidelity and much more realistic for the training of today's soldiers.[20] Some of these devices are stand-alone, others are appended and now emerging on new developmental systems is the capability for embedded training. Stand alone training systems are fundamentally self-supporting. These devices come with their own training weapon system (Dragon, TOW or Javelin missile) or crew compartment (tank or infantry fighting vehicle) and use computer graphics imagery to represent a through-the-sight battlefield. Appended training systems are mounted on combat vehicles to allow use of actual weapon controls and system

ballistic software. This permits an even more realistic training environment. The new thrust for embedded training systems means that new systems being developed will have a (built-in) capability to train soldiers using the actual weapon system. Although there is much similarity, each type of training device or simulator satisfies particular training requirements.

Armor Training Devices

Armor units have multiple training needs. Not only must each M1A1/2 Abrams tank crew 'qualify' with the main gun (105mm or 120mm), each platoon of four tanks must also be 'qualified' as a platoon. This requires training of both precision gunnery (tank crew) plus maneuver and fire distribution (platoon) techniques. Skills necessary for crews to rapidly engage multiple moving targets under a variety of conditions must be trained repeatedly and frequently to maintain proficiency. Platoons must maneuver and engage targets as platoons to retain the ability to defeat enemy armor formations. Both crew and platoon training can now be accomplished with training simulators that are deployable.

Tank crews have been training on simulators for a number of years. Every experienced tank crewman has spent many hours in the Conduct-of-Fire Trainer (COFT). The COFT is stand-alone precision gunnery training device for tank gunners and commanders. Each COFT is comprised of: a crew compartment which replicates the combat vehicle crew compartment; an instructor-operator station for controlling and monitoring exercises; an after action review (AAR) station for review and critique of exercises; and the graphics imagery and control computers. The COFT allows the gunner

and commander to view the battlefield through weapon sights and engage simulated targets in a variety of conditions. COFTs are now fielded at one per M1A1 tank battalion.

The Platoon Conduct-of Fire Trainer (PGT) consists of four COFT crew stations linked together to train crews of a platoon of Abrams tanks or Bradley Fighting Vehicles. Crews (gunners and commanders) train precision gunnery skills while the platoon leader trains command and control, maneuver and fire distribution skills. PGTs are currently located at Fort Knox, Kentucky, and Vielseck, Schweinfurt and Baumholder, Germany. Although not currently deployable, the PGT could be made deployable with modification. However, this is not likely cost-effective.

The Army's state-of-the-art conduct-of-fire trainer is the Advanced Gunnery Training System (AGTS). The AGTS incorporates features of both the COFT and the PGT and is designed to replicate the latest (M1A2) version of the Abrams tank. The AGTS is much smaller and more capable than any other similar device and is the armor community's precision gunnery trainer of choice. It can be used separately to train crews or networked via Distributed Interactive Simulation (DIS) protocols to conduct platoon training. The AGTS can be built in one of three configurations: (1) *permanent,* to be used at fixed sites, such as the U.S. Army Armor Center and School, Fort Knox, Kentucky; (2) *relocatable*, which means that the system is mounted in a shelter that can be picked up and moved, if required, to any location with a concrete pad and power source; and (3) *mobile*, meaning that the system is mounted in a shelter on a trailer along with its own power source for both ease of mobility and independent operations anywhere. The AGTS has been fielded to the Armor School at Fort Knox and to active Army units beginning with the 1st Cavalry Division at Fort Hood, Texas.

Current armor appended trainers include: the Armor Full-crew Interactive Simulation Trainer (AFIST), formerly called GUARDFIST I; and the Tank Weapons Gunnery Simulation System (TWGSS). These devices are appended to the combat vehicle for training and evaluation. The main advantage of appended trainers is that crews can train on the actual vehicle, system, and controls. The main disadvantage of these systems is the time (generally 1-2 hours) that it takes to install the equipment.

AFIST is a full crew appended gunnery trainer for the M1 Abrams series tank. Facades and monitors installed on the tank are connected to an instructor/operator console which controls the computer generated exercises. The gunner and tank commander view computer generated imagery through tank sights. The entire tank crew (driver, gunner, loader and commander) can train and be evaluated on a wide variety of scenarios and conditions using the actual tank and its controls. Although AFIST is being fielded to only National Guard units, two systems were sent to Bosnia for active Army unit training during the peacekeeping Operation Joint Endeavor. Distribution for NG units is 1 AFIST per company or 2 per company in enhanced brigades.

TWGSS is a two-way laser device that trains precision gunnery on M1 series tanks during force-on-force and force-on-target exercises. TWGSS simulates the main weapon system through aural cues and video images displayed in the gunners' sights and provides a greater degree of realism to training. TWGSS also provides accurate firing results (to 0.1 meter accuracy) for immediate after action review. TWGSS is also compatible with the Multiple Integrated Laser Engagement System (MILES). This allows TWGSS to be used in combined arms force-on-force exercises with other MILES or MILES-compatible

systems, to include those described in succeeding paragraphs. The current distribution is 14 TWGSS per tank battalion.

Although the capabilities of some of the training devices previously mentioned may overlap to a limited degree, the devices are not redundant. Each trains selected critical tasks. All are used by the armor community as fundamental to the armor training device strategy which integrates maneuver and precision gunnery live-fire training with training device and simulator exercises. These exercises are complimentary and advance from individual and crew training through platoon and company training.

Infantry Training Devices

Training devices/simulators for the dismounted infantry are primarily for anti-tank missile systems such as the Dragon, TOW, and Javelin. The Precision Gunnery Training System (PGTS) for the Dragon and TOW anti-tank missile systems has both indoor and outdoor versions. The indoor PGTS consists of a simulated Dragon or TOW missile launcher on a tripod and an instructor station. The gunner looks through the weapon sights to acquire, detect and engage enemy targets. Exercises are controlled, monitored and scored via the instructor station. The outdoor PGTS is a similar but also MILES compatible version.

Primary training devices for Javelin include the Basic Skills Trainer (BST) and the Field Tactical Trainer (FTT). The BST is an indoor computer graphics imagery trainer that allows the gunner to engage a variety of enemy vehicles in numerous exercises. The

FTT is a MILES based device that allows Javelin to participate in force-on-force exercises.

The Precision Gunnery System (PGS) is the Bradley Fighting Vehicle version of TWGSS, described above. PGS simulates the Bradley's main weapon (25mm gun) and the TOW weapon system. Like TWGSS, PGS is MILES compatible. The distribution is 14 PGS per mechanized infantry battalion.

Field Artillery Training Devices

Field artillery trainers include the Guard Unit Armory Full-crew Interactive Simulation Trainer (GUARDFIST II) and the Fire Support Combined Arms Tactical Trainer (FSCATT). GUARDFIST II is a transportable training system that provides simulated battlefield scenarios for the training of field artillery forward observers (FOs). There are two versions: the one-on-one version which trains one FO and a one-on-thirty version which is a wide screen version set up in a classroom to train up to 30 students at a time. GUARDFIST II trains the FO to operate the Digital Message Device (DMD) which is used by FOs to (digitally) call for fire. Through computer generated graphic imagery, FOs can observe, identify and locate targets, and call for and adjust artillery or mortar fire. In the interactive mode, GUARDFIST II can also be digitally linked with the Battery Computer System (BCS) to concurrently train artillery fire direction center (FDC) personnel.

FSCATT is a gunnery team trainer. The deployable version of FSCATT consists of a network of the GUARDFIST II FO trainer (described above) and a number of Howitzer

Strap-on Trainers (HSOTs). FSCATT allows the simultaneous training of both the FOs and the FDC via GUARDFIST II, and towed or self-propelled howitzer crews via HSOTs which train and monitor howitzer crew performance.

Combined Arms Collective Trainers

MILES is often disregarded as a deployable training device. MILES provides tactical engagement simulation in the form of laser "bullets" for direct fire force-on-force training for individuals, vehicles and weapons. Each individual and vehicle are equipped with a detection system to sense hits and perform casualty assessment. Laser transmitters are attached to each individual and weapon system and accurately replicate actual ranges and lethality of specific weapon systems. MILES can be used to provide enhanced training realism for dismounted infantry.

An additionally capability that can be deployed is the Precision Range Integrated Maneuver Exercise (PRIME). PRIME is a mobile system that provides 360 degree free play force-on-force and force-on-target laser-based exercises on an instrumented maneuver area. Target and player systems are linked to the command and control system through telemetry incorporating a global positioning system (GPS) to provide continuous player location, player identification, and automatic target control. Computer event-driven scenarios can also provide targets that shoot back to add battlefield stress. The PRIME instrumentation records crew and unit performance in support of gunnery and maneuver training for detailed after action review.

Training Device Utility

Training devices have great utility. Some training devices, such as TWGSS/PGS for example, can actually pay for themselves through a significant reduction in the number of main gun rounds per combat vehicle crew per year. For armor units equipped with TWGSS, 10 rounds are deducted from each tank crew's annual round allocation. For Bradley Fighting Vehicle crews, the number of 25mm rounds is reduced by 25 rounds per year when PGS is available.

Training devices save wear and tear on combat vehicles. Second and third order effects are longer intervals between repairs and a reduced demand for Class IX repair parts. Overall effect is that combat vehicles can remain operationally ready for longer periods.

The use of training devices also reduces fuel costs. Coupled with the costs for wear and tear, the cost savings are significant. According to David Reiss, Chief of Training Simulation at Fort Benning, Georgia, "If we don't plan alternative methods of training, our field equipment will be too expensive to operate in the year 2000."[21] The bottom line is that training devices are economical.

Training devices serve various purposes. Many training devices, for instance, are produced to serve as part task trainers. In other words, they train selected fundamental tasks such as gunner control handle familiarization and facilitate learning proper hand-eye coordination. Many of these tasks are learned simply through repetition and can be effectively trained by a device that is designed for such tasks. An example of a part task trainer is the Videodisk Gunnery Simulator (VIGS). VIGS is a table top gunnery trainer

that allows tank gunners, via simulated tank sights and controls, to acquire and engage enemy targets. VIGS focuses on target acquisition and tracking skills, gunner response to simulated fire commands and gunner hand-eye coordination.

Training devices also provide more realistic/full system capability. Combat vehicle crews, for example, can exercise all systems. In realistic exercises, simulators can be made to fire back to ensure that crews engage enemy vehicles in the allotted time. Crew simulators can also be set to allow crews to operate in the degraded mode. Crews must then overcome system degradations to engage targets. Tank crews can be forced to operate without the benefit of a stabilized turret or a working laser range-finder, for example. Normally, few rounds can be afforded for such exercises on live-fire ranges. Although never the same as combat, exercises such as those mentioned above can be used to "stress" the crews in simulated combat scenarios.

An often greatly underrated capability of training devices is their ability to train operators to react to virtually an endless number of situations. Performing such training under real conditions is cost prohibitive. Some of the scenarios would be too dangerous to the individual or crew to perform or could cause irreparable damage to equipment. Due to the high cost and danger to soldiers, some tasks are now not trained or are poorly trained. However, training devices can supplement live training to allow operators to repeatedly "experience" and react to otherwise dangerous situations so that correct actions can be learned. For example, some devices allow drivers to experience conditions that would normally cause their vehicle to overturn or throw a track. Drivers can learn to avoid such conditions or movements that would cause either of these situations. Some devices also train vehicle drivers to avoid undue exposure of their vehicle to flanking

enemy fire. Training devices also train crews to fight from hull defilade positions to avoid full vehicle exposure to enemy fire.

While using training devices, gunners and vehicle commanders can also enhance vehicle recognition skills. Simulations can provide multiple vehicle orientations plus hull defilade or terrain masked positions in a variety of weather or visibility conditions. Gunners and commanders can train to properly identify vehicles and to maintain better battlefield awareness in order to avoid fratricide. This is particularly important on battlefields where both friendly and enemy forces use some of the same type combat vehicles. As the U.S. continues to participate in coalition operations, this type of training is absolutely critical.

Many training devices are designed to train both individual and collective skills. Crew simulators for the Abrams tank and the Bradley Fighting Vehicle can train not only the gunner and commander but the entire crew (which includes the driver and loader) on some training devices.

Some training devices facilitate force-on-force training. This allows vehicle crews, platoons or even companies to "fight" against one another in a simulated battle.

Training devices/simulators make field training and live-fire training more beneficial. Field training becomes even more productive because units have prepared and trained to a higher level before they move to the field. The result is fewer wasted rounds. Preparation can ensure that all rounds count, that there are more first round hits and fewer refires. The resultant savings in both time and ammunition costs is not insignificant.

The use of training devices permits a shorter train-up time. Training devices or simulators can train core tasks before going to the field. Individuals or crews can spend

whatever time is needed to become proficient. Time, fuel and ammunition no longer become the cost drivers between "qualified" and "unqualified" crews. Vehicle commanders can spend the time required to train their crews without the pressure to conserve fuel and ammunition on the range.

New gunners and/or commanders can become proficient in scanning and engaging targets as a team. This is fundamental particularly in the M1A2 with the capability for the gunner and commander (via the Commander's Independent Thermal Viewer or CITV) to independently search for targets.

Another advantage of training devices is that they can be used to train for a variety of conditions or contingencies. Many devices allow the operator to select the type of terrain or scenario. This enhances the opportunity to be prepared for war in a two MRC strategy. Operators can train on a southwest Asia terrain, a desert database (MRC one), and also on a Korean terrain database (MRC two). Crews can also train in limited visibility situations and with a variety of weather conditions.

Maintaining combat skills proficiency also enhances morale and confidence. Use of these devices can also enhance interoperability with allies possessing U.S. equipment.

The major benefit of the modern suite of training devices is their synergistic effect within the training domain. These devices can be fielded to units at home station to train and hone core skills and can then be deployed with soldiers on contingency missions to sustain combat skills.

Bosnia Training Device Experience

Deployable training simulators have existed for only a few years. Technological advances made only a very small number of these type devices available for Operations Desert Shield and Desert Storm. Obtaining any significant data from the use of training devices during deployments was not possible until Operation Joint Endeavor, the peacekeeping operation in Bosnia.

During Operation Joint Endeavor, the U.S. deployed the 1st Armored Division (AD), from Germany as Task Force Eagle, the U.S element of NATO's Implementation Force (IFOR). To support this effort, the 7th Army Training Command (ATC), Germany established a forward (regional) training site in Taborfalva, Hungary. The 7th ATC established live-fire ranges and a training support site at the Taborfalva Training Area (TTA). The training support site served several important functions. It managed the distribution of training devices being sent to deployed units; served as collection point for return and repair of training devices that were deployed with Task Force Eagle; and, established and maintained several live-fire/maneuver training ranges. This greatly enhanced the training proficiency of deployed combat soldiers but it required careful management in order coordinate the rotation of units for training. Although effective, this arrangement was certainly not without significant cost. It also required a considerable commitment of personnel.

The primary focus of Task Force Eagle was to perform peacekeeping missions. Not until the implementation of a General Framework for Peace could leaders actually begin to plan training. There were many constraints to training, not unlike the constraints stated

previously. These included: the mission came first; force protection requirements limited the time to train; collective training opportunities were limited; many training assets were unavailable; and there was a lack of training doctrine to address implications of training while "employed".[22]

Task Force Eagle utilized Field Manuals (FM) 25-100 *Training the Force* and 25-101 *Battle Focused Training* as the cornerstone for training management and strategy, even though these documents were written for training in a peacetime environment. MG William L. Nash, Commander, Task Force Eagle, had four training objectives. They were: Battle Command/Staff Training, Warfighting Skills, Leader Training, and Training Management. His guidance was to "Train on the basic war fighting skills based on CTT [Common Task Training] requirements, MOS specific, and collective warfighting tasks. Units will focus on individual, squad/crew and platoon level operations . . . " His guidance would focus the task force toward two main requirements. The first requirement was the highly successful completion of the peacekeeping mission. The second was the development of an accurate unit assessment prior to redeployment which would serve as the basis for follow-on mission training plans.[23]

To complete the Bosnia peacekeeping mission, MG Nash emphasized the importance of maintaining critical combat skill proficiency. He stated that Task Force Eagle " . . . success is directly proportional to our credibility and proficiency at warfighting."[24]

In July 1996, during the peak of Task Force Eagle's activities, 155 training devices for armor, infantry and artillery units were deployed either with units in Bosnia or at the Hungary training support site. Many of these devices had been fielded to and deployed with 1st AD units from Germany. The remainder were provided by the U.S. Army

Simulation, Training and Instrumentation Command (STRICOM), Orlando, Florida. These training devices included: 49 PGTS; 16 TSV; 2 AFIST; 4 GUARDFIST II; and 42 each TWGSS and PGS.[25] The clear focus was upon warfighting skills, as MG Nash had directed.

Marksmanship and gunnery are quite possibly the most degradable of all skills in any unit. Task Force Eagle separated gunnery training into two components, Pre-Gunnery Training and Gunnery Training. As unit master gunners evaluated units, they discovered weaknesses in gunnery. As a result, the unit master gunners integrated TWGSS/PGS training in Tank Crew Proficiency Courses (TCPC) and Bradley Crew Proficiency Courses (BCPC) to exercise pre-gunnery skills prior to movement to Hungary to conduct live-fire. Upon completion of TCPC/BCPC, master gunners determined which crews were not as strong as others in crew skills. These crews were usually the newer crews and were sent to the TTA with the advance party in order to utilize the mobile COFTs. These crews were given an additional 10 hours of training prior to qualification on the live gunnery range. Additionally, the next company scheduled to qualify at TTA was given priority on the use of TWGSS/PGS. The task force had fielded TWGSS/PGS during deployment after some of the units had already qualified in gunnery. The overall task force assessment of TWGSS/PGS training was that "the units that received TWGSS/PGS systems improved in fire commands and crew tasks during gunnery qualification."[26] Another lesson learned was that "units that did not get TWGSS/PGS prior to pre-gunnery needed more time to adjust to the training in TTA."[27] Specific gunnery scores are not available.

Task Force Eagle utilized training devices to supplement unit training in Bosnia. Training device records also provided information to be used by task force leaders in

assessing post deployment individual, crew and platoon combat proficiency. In summary, training devices played an important role in the sustainment training of combat soldiers. A final lesson learned from the Bosnia experience is that units must " . . . begin to plan training while employing."[28] This is clearly a fundamental capability of many of today's training devices, particularly those described in this paper. This is also well within the realm of capability for future training devices. Recently, a brigade of the 1st Infantry Division (ID) deployed from Germany to serve as the "covering force" for the withdrawal of the 1st Armored Division from Bosnia. Approximately 30 Abrams tanks and 100 Bradley Fighting Vehicles remain in Bosnia as part of the "stabilization force" (SFOR).[29] As before, training devices have been deployed for sustainment training of combat forces.

Training Device Philosophy

Absent a declining defense budget, the U.S. Army would likely use the "idealist" philosophy toward training device utilization. That is, training devices should be used along with the current levels of live-fire exercises to continue to *increase the level of training proficiency* of soldiers. However, funding for training is a very significant issue. Resources for training and procurement continue to decline with the promise of future years' budgets being even more austere. As expected, the Army has adopted a "realist" philosophy for the use of training devices. What this means is that the Army makes a trade-off of some live-fire training for the acquisition of training devices resulting in soldiers remaining at the *same level of training proficiency*. While mothers and fathers of soldiers, along with commanders, would strongly prefer the idealist approach which would result in better trained soldiers, the realist approach is more appropriate for an army with a

shrinking defense budget. The current Army Chief of Staff continues to press for efficiencies, or measures of effectiveness, that result when training devices are employed. An under-funded army cannot expend funding on devices that do not offset live training. Training device and simulator materiel developers continue to pursue technology that will allow cost-effective trade-offs to reduce the expenditure of both ammunition and fuel. Without realizing such economies from trade-offs of live training, the U.S. Army can ill afford to fund new training device acquisition.

Recommendations

Training devices today offer the capability for combat forces to sustain critical combat skills. The devices are easily deployed with their respective units and are a cost-effective means to address the training readiness issue for deployed combat forces. In this austere military budget environment, the Army must seriously consider increased acquisition of these devices.

Specific recommendations are as follows. The Army should:

a. continue to acquire and field quality training devices to combat units.

b. analyze training device usage to realize effectiveness/efficiency and to justify future expenditures. Many training devices pay for themselves - or could be made to pay for themselves - over the life cycle of the system through savings in ammunition, fuel and wear and tear on combat vehicles. Before a training device is developed through the acquisition process, the materiel developer should be required to perform a detailed cost benefit analysis of the projected cost savings to be realized by fielding the training

device(s). If there is no cost savings or significant training enhancement to be realized, the training device should not be acquired. That is, training devices are worth the cost but not at any cost.

c. continue to deploy training devices with combat units to sustain critical combat skills.

d. acquire future training devices that are:

(1) *quick to set up and simple to operate.* The training devices must be easily deployed and set up for training. Training time for deployed soldiers is at a premium. Soldiers cannot afford long set up times. Likewise, the equipment must be simple to operate and maintain.

(2) *affordable* and more *cost effective* to operate and maintain than using the actual vehicle or weapon system for all phases of training. See discussion above.

(3) *robust.* Although training devices must be easily maintained, they must be capable of extended operation without maintenance. They must also be capable of operating continuously in a wide range of climatic conditions on a variety of power sources.

(4) *deployable.* Training devices must be available for training at the unit level and small or portable enough to be deployed.

(5) *easily updated.* Weapon systems (or weapon system software) frequently change to incorporate the latest technology. (For example, a new version of the M1A2 Abrams tank system software is expected to be released about once per year.) As weapon system software is updated, training devices must be updated to reflect the software changes that affect training devices operations. Training devices must be

designed for economical and easy updating to ensure that the training device operates like the actual weapon system. If the training device is difficult and/or expensive to update, there will be an unacceptable lag between the weapon system in the field and the configuration of the training device. Soldiers would then be training on a "different" system from the system they would be using in combat. This "negative" training must be carefully avoided.

(6) *interoperable.* Training devices must be capable of connecting electronically to other training devices for unit or combined arms training.

(7) *embedded.* Future combat systems must have an embedded training capability designed into the combat system from the ground up. This will eliminate the need for separate training devices and allow soldiers to train on the actual combat system/vehicle.

The Future of Training Devices and Simulators

Embedded training is the Army's direction for the future. New technologies now make it possible to embed training devices into combat systems. The Army has directed that each new weapon system have an embedded training capability. Embedded training capability means that training devices are to be designed into the tactical weapon system from the very beginning rather than as a stand-alone or appended device. There are many advantages of this increased capability including: the ability to train on the actual weapon system; economies achieved by eliminating a separate training device; and the ability of the soldier to train anytime and anywhere.

The Improved Target Acquisition System (ITAS) for the TOW anti-tank missile is the Army's first tactical weapon system with embedded training capability. Each ITAS now being produced contains two circuit cards whose sole function is for training. The TOW ITAS gunner can train, via digital scenes and virtual engagements, looking through his weapon sights while in his fighting position. Then, with the flick of a switch, he can revert to the tactical mode to directly engage an enemy armored vehicle coming into range. The Nintendo warrior has come of age in the 1990s!

Conclusion

Offering a view of the present and a vision of the future plans for training devices is GEN David A. Bramlett, Commander, U.S. Army Forces Command (FORSCOM). In a recent interview with *National Defense*, GEN Bramlett stated that he is looking to industry to supply simulators that can be deployed with units. He sees the added value that simulators provide, particularly to weapons crews.[30] According to noted defense and aerospace analyst, Curtis Meisenheimer, "Simulation is going to continue to remain an important factor. It's a lot cheaper than . . . tank fuel, and live exercise costs."[31] The Army's challenge is to find the proper balance between field training and training from simulations.

An assessment of the long-term effects of the current U.S. National Security Strategy and the National Military Strategy upon military operations is clearly reflected in a recent statement by the Army Vice Chief of Staff, GEN Ronald H. Griffith. He has stated that "there appears to be no immediate relief for the heavy deployment schedule."[32] For this

reason, it is absolutely essential that the Army continue to remain trained and ready. It is particularly important that deployed combat forces have the capability to remain combat capable. This is true today and is consistent with the vision of future missions of our combat forces.

Furthermore, the second edition of Training 2000, an exhaustive market survey prepared by the National Training Systems Association (NTSA), reports that "Congress is willing to spend more in the near term on simulation and training as long as the overall impact on military readiness can be shown to be positive and the cost lower than other means of training."[33] It is clear that the time is now for Army leaders to make decisions concerning the balance of simulation (training devices) and live fire training. The challenge is to (cost) effectively sustain the combat skills of soldiers who are being deployed with increasing frequency to conduct a wider range of missions than ever before.

As GEN George S. Patton, Jr. said, "Wars may be fought with weapons, but they are won by men."[34] Soldiers in the high technology Army of today and tomorrow must have the means to sustain the volatile skills required to fight advanced weapons systems. The Training and Doctrine Command (TRADOC) draft document, ARMY 21: A Concept for the Future, emphasizes that " . . . in any consideration of the future it is important to note that, in spite of high technology, the will and skill of the individual soldier . . . will still be the key to success."[35] *Army Vision 2010* is the Army's strategy for the future. Vision 2010 maintains that the Army's first priority is winning the nation's wars. The second priority is " . . . providing a range of military operations short of war."[36] From this strategy, it is clear that U.S. soldiers will continue to deploy world wide to perform contingency missions. It is imperative that both now and in the future our soldiers remain

trained and combat ready, even when deployed. While training devices cannot replace live field training, they can meet the Army's needs to *sustain* the critical skills of deployed combat forces when live fire training is unavailable.

ENDNOTES

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